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[Note : Names, addresses, Company names and brand names are translated in the most common manner. Japanese Language does not have singular or plural words unless otherwise specified with numeral prefix or general form of plurality suffix. Translator's note.]

Description of the invention

1. Name of the invention

Device used in lighting and displays

2. Claims of the invention

(1) Device used in lighting and displays, characterized by the fact that it is formed from a fluorescent lamp etc., linear type light source and a cover for the above light source. That cover has a box body where at least on two or more surfaces a sheet shaped transparent material is adhered. This sheet shaped transparent material is formed from continuous microprisms used in order to transport the light from the above described light source.

(2) Device used in lighting and displays according to the above described claim (1) of the present invention characterized by the fact that the longitudinal direction of the above described linear light source is positioned so that it forms an almost perpendicular angle relative to the folding direction of the vertical angle of the microprisms of the sheet shaped transparent type material.

(3) Device used in lighting and displays according to the above described claim (1) of the present invention characterized by the fact that the above described sheet shaped transparent material is formed from the side that has the microprisms and the opposite side that has a flat surface, and the vertical angle surface is directed towards the outer direction of the lighting or display device so that the light beam enters through the flat surface.

transparent material is positioned so that the angle formed between the folding line of the vertical angle of its microprisms and the longitudinal direction of the light generating body, is almost perpendicular, and the surface of the vertical angle is adhered in the direction of the different lighting sides.

(5) Device used in lighting and displays according to the above described claim (1) of the present invention characterized by the fact that in order to obtain a homogeneous lighting distribution, the linear light source is covered by a cover.

(6) Device used in lighting and displays according to the above described claim (1) of the present invention characterized by the fact that on the outer surface of the sheet type transparent material a light diffusive material that performs the display, is placed.

3. Detailed description of the invention

Technological sphere of application

The present invention is an invention about a device used in lighting and display that has a light generating surface that can be used in advertising etc..

Previous technology

In the case of the used according to the previous technology devices used in lighting and display application where a specific surface is illuminated, for example as it is shown in Figure 6, usually it has a structure that is formed from a diffusive plate (11), that is formed from a light diffusing material, a complex number of fluorescent light lamps (12) in order to illuminate the diffusive plate (11), and a frame (13) inserted between the above described diffusive plate (11) and the above described fluorescent light lamp (12). However, in the case of such a device, in order to maintain the brightness of the diffusive plate (11) that is the light generating surface, homogeneous, it is necessary that the distance between the diffusive plate (11) and the fluorescent light lamp (12), is large. As a result from that, there is the drawback that the thickness of the device is increased. Also, when the distance between the the diffusive plate (11) and the fluorescent light lamp (12), becomes larger than necessary, the amount of light generated from the diffusive plate (11) is decreased and in order to alleviate that problem, it is necessary to increase the number of the fluorescent light lamps (12). By that, the structure of the device becomes complex and the weight is also increased and also the power consumption is increased.

Such lighting and display devices obtained according to the previous

when they are used in outdoor advertisement lamps, there are the large drawback points that the amount of time needed for the mounting is large and because of that the industrial feasibility properties become poor. Because the number of the fluorescent light lamps is high, the cost also becomes high.

and the the numbers of changes of the fluorescent light lamps also is increased, and also the power consumption is large. Also, in the case when it is used in the field of observation for photographic films application, there is a part that has the fluorescent light lamps and a part that does not, and because of that it is possible to generate nonhomogeneous brightness on the diffusion plate of the light generating surface, and when the film is viewed this creates large losses. Also, because the thickness of the device is large, it is not possible to be used in applications that are required for specialized viewing equipment etc..

Problem points solved by the present invention

The goal of the present invention is in order to solve the drawbacks related to the lighting and display devices used according to the previous technology, to suggest a device used in lighting and display, that has a light generating surface where there is no inhomogeneousness in the brightness, it is thin and light weight, and also the power consumption is small.

Measures in order to solve the problems

The device used in lighting and displays, according to the present invention has a structure characterized by the fact that it is formed from a fluorescent lamp etc., linear type light source and a cover for the above light source, that is a box body where at least on two or more surfaces sheet shaped transparent material is adhered. This sheet shaped transparent material is formed from continuous microprisms used in order to transport the light from the above described light source.

Practical Example

Here below, a practical example according to the present invention will be explained based on the diagrams. Figure 1 represents a diagram of the lighting and display device appropriate according to the present invention in its disassembled state.

The sheet shape transparent material (1) can be made of transparent resin material, and one surface is a flat surface (1a) and the other surface is the prism surface (1b) where prisms are ordered continuously. The diffusive plate (2) is made of light diffusion material that has milk white color and this becomes the light generating surface, and depending on the requirements it

reflective plate (4) is a material that has a reflection coefficient and that sufficiently reflects the light from the light source (3). For example, it can be made from a resin sheet with adhered on it aluminium vapors. The frame (5) can be made of a material that does not transmit light, for example, it can be

made from an iron plate etc.. The surface that is in contact with the sheet type transparent material (1) becomes white in color.

Figure 2 represents a sectional view of a lighting device where the present invention has been appropriately used. Regarding the sheet material (1), the prism surface (1b) is contacted with the diffusive plate (2) and the frame (5) and a mounted (assembled) box body is formed and the light source (3) is covered. As the mounting (assembling) method, the method where a double sided adhesive tape is used, the method where it is thermally melted and adhered, etc., different types of methods can be considered. However, it is important that it is an assembly method that does not cover the prism surface (1b). On the outer surface of the sheet shaped transparent material (1) the reflective plate (4) is attached on the outside of the assembled surface. The light source (3) is mounted so that the folding line of the vertical angle of the prisms of the width of the sheet shaped transparent material (1) and the longitudinal direction of the light source (3), form almost a straight angle. On the opposing far position relative to the light source (3), the reflective plate (4) is mounted.

After that, the action according to the practical example of the present invention, is shown.

Regarding the light that is generated by the light source (3), first, one part of it passes through the flat surface of the sheet shaped transparent material in the state as it is and the remaining part is reflected, and finally it is reflected by the reflecting plate (4). Also, inside the device, the reflection and the transmittance are repeated. As a result from that, the light that is transmitted from the sheet shaped transparent material (1) does not depend on its position and it becomes almost homogeneous. And then, this light passes through the diffusive plate (2) and by that it is diffused, and it becomes a light generating surface that homogeneously generates light. Regarding the light that is transmitted from the surface of the sheet shaped transparent material (1) that is outside of the diffusion plate (2), it is reflected by the frame (5) which inner surface has a white color and again it is directed towards the inner part of the device.

By this action, it is difficult for the light that has passed through a surface other than the diffusion plate (2), to be diffused in the state as it is to the outside, and by that it is possible to increase the amount of light that is generated from the diffusion plate (2).

Plate (2) has only one surface, it is possible to make materials where reflective plates with two and more surfaces are mounted, and a large number of light generating surfaces is obtained. Also, it is a good option if the inner surface of the frame (5) is not white, but instead a reflective mirror is used. As the light

source, without using linear light sources like fluorescent light lamps etc., if a complex number of point type light sources like a white thermal lamp, are used, it is easy for these to become a source of brightness inhomogeneousness, and by the heat that is generated from the point type light sources, different losses are generated because of the change in shape etc., of the sheet shaped transparent material (1), and because of that it is good if a linear type of light source is used. Regarding the linear type light source, it is not limited only to a fluorescent light lamp, but also neon tubes, linear shaped white thermal lamps etc., can be considered.

Also, as it is shown in Figure 3, on the side that is close to the frame (5) that is limiting the width of the light source (3), a reflective plate (6) is fixed, which shape of the sectional surface is close to the parabola line shape. And by the fixing of another reflecting plate (7) that has the same shape as the reflective plate (6) and is positioned in a position opposite to it, the light that is generated from the light source (3) is passed through the sheet shaped transparent material (1) with a good efficiency. As a result from that it is possible to increase the amount of the light generated from the reflective plate (2). Moreover, in the case when it is necessary to further increase the amount of light, it is also a good option to place a linear light source in front of the other reflective plate (7).

According to each of the above described practical examples, the sheet type transparent material (1) is glued on the total surface of the outside surface where the reflective plate (4) is glued. However, in the case when as the light source (3) a source with a sufficiently small length is used, and the thickness of the device used in lighting and displays is sufficiently small, the surface where the sheet type transparent material (1) is glued can be practically glued only on the surface of the reflective plate (2) and the opposite to that surface of the frame (5), and there would be no problems. The sheet shaped transparent material (1) is not limited to a resin material, and it is also possible that it is made of transparent glass etc., materials.

After that, an explanation is given regarding a source where the inhomogeneousnesses in the brightness are still smaller and also where the amount of light on the light generating surface is further increased. This explanation is given by using the diagrams in Figure 4 and Figure 5. If the distribution of the amount of light from the fluorescent light lamp is described, it is bright in the center, and on both sides the amount of light is decreased, and this becomes a reason for the generation of inhomogeneities

in the light distribution. In the case of the device used in lighting and displays, in this state there is a large amount of light that is not advantageously and effectively used in the case of the device used in lighting and displays, according to the present invention. As measures in order to improve on the above described two drawback points, as it is shown in Figure

4, a cover (9) is attached in the longitudinal direction of the fluorescent light lamp (10). This cover (9) has the radiation opening (8) that has a narrow center part and a it is widened on both ends. By doing that, the difference between the amount of light from the center part and both end parts of the fluorescent light lamp (1) is eliminated, and then, the light that is irradiated in the directions of 360 degrees can be focused in the desired direction. By that, there is the advantage that it is possible to increase the amount of light. Figure 5 is also similar to Figure 4, however, it is a case where the shape of the cover (9) is simply formed as two openings (8) are positioned in the direction parallel to the axis line.

Results from the present invention

As in the above described, according to the present invention, it is a device where instead of the complex number of of light sources used according to the past technology, only one or two can be used, and consequently, it is possible to decrease the power consumption and also to make the device thin and light weight. Also, by the action of the prisms, there is the result that it is possible to reduce the inhomogeneities in the brightness of the light generating surface.

Then, by using linear type light sources, it is possible to further reduce the inhomogeneities in the brightness of the light generating surface, and it is possible to avoid the effect of the heat generated by the light sources.

If the present invention is appropriately used in outdoor advertisement applications, it is said that there are the advantages that because it is a light weight device, the installation work becomes easy, and because it has a thin shape, it does not take up much space for the assembly, and also, because the number of the fluorescent light lamps is small, the power consumption is small. Also, in the case when it is used in the observation field of the photographic films, because there are only small inhomogeneities in the brightness of the light generating surface, it becomes easy to conduct a precise viewing procedure of the photograph, and because it is light weight and narrow in width, it becomes easy to be carried and transported. Even if it is installed over the already existing equipment, there are no deviations. Besides that, also, it is obvious that the devices used for lighting and displays where the procedures according to the present invention have been appropriately used, can be different types etc..

Figure 1 represents a diagram of the the devices used for lighting and displays where the procedures according to the present invention have been appropriately used. It is a diagram in a disassembled state.

Figure 2 represents a sectional view diagram of the shown in Figure 1 device. Figure 3 represents a sectional view diagram of another practical example according to the present invention. And Figure 4 represents a three-dimensional diagram of the fluorescent light lamp cover used according to the procedures of the present invention.

Figure 5 represents a three-dimensional diagram of a modification of the example shown in Figure 4.

Figure 6 represents a partially dissect projection type diagram of the devices used for lighting and displays where the procedures according to the previous technology.

- 1.....sheet shaped transparent material
- 1a.....flat surface
- 1b.....prism surface
- 2.....diffusive plate
- 3.....light source
- 4.....reflective plate
- 5.....frame
- 6,7.....reflective plates
- 8.....opening
- 9.....cover

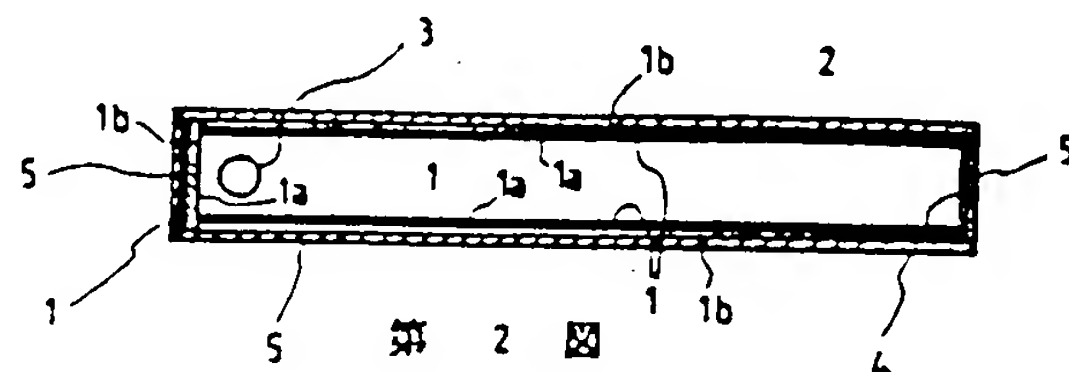
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Translated by Albena Blagev (6-7946)

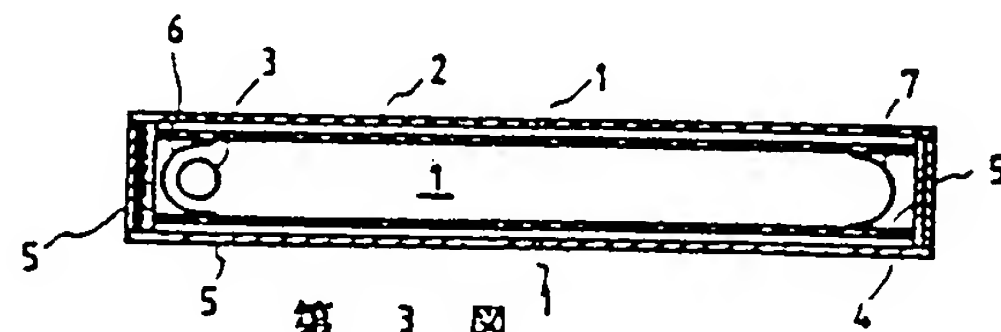
2/26/95

プリズム面、2…拡散板、3…光源、4…反射板、
5…フレーム、6、7…反射板、8…開口、9…
カバー。

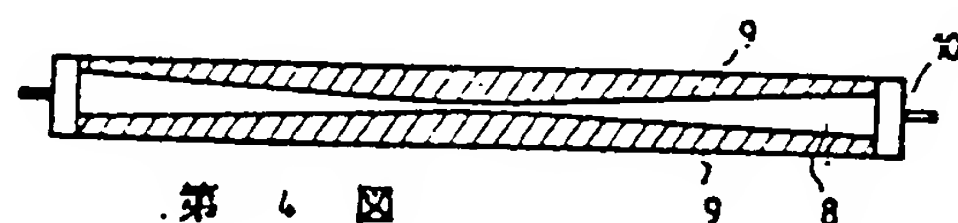
特許出願人 伊 東 益 助
(ほか1名)
代理人 弁護士 竹 本 松 司
(ほか3名)



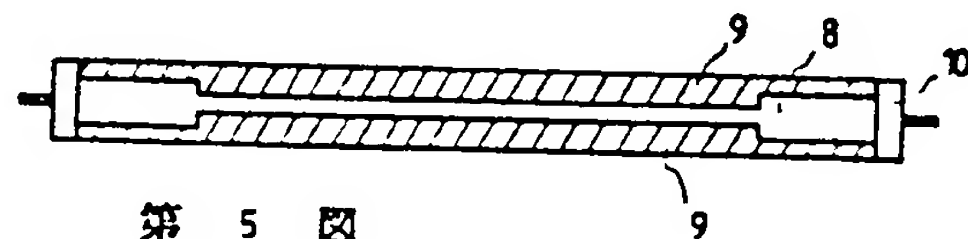
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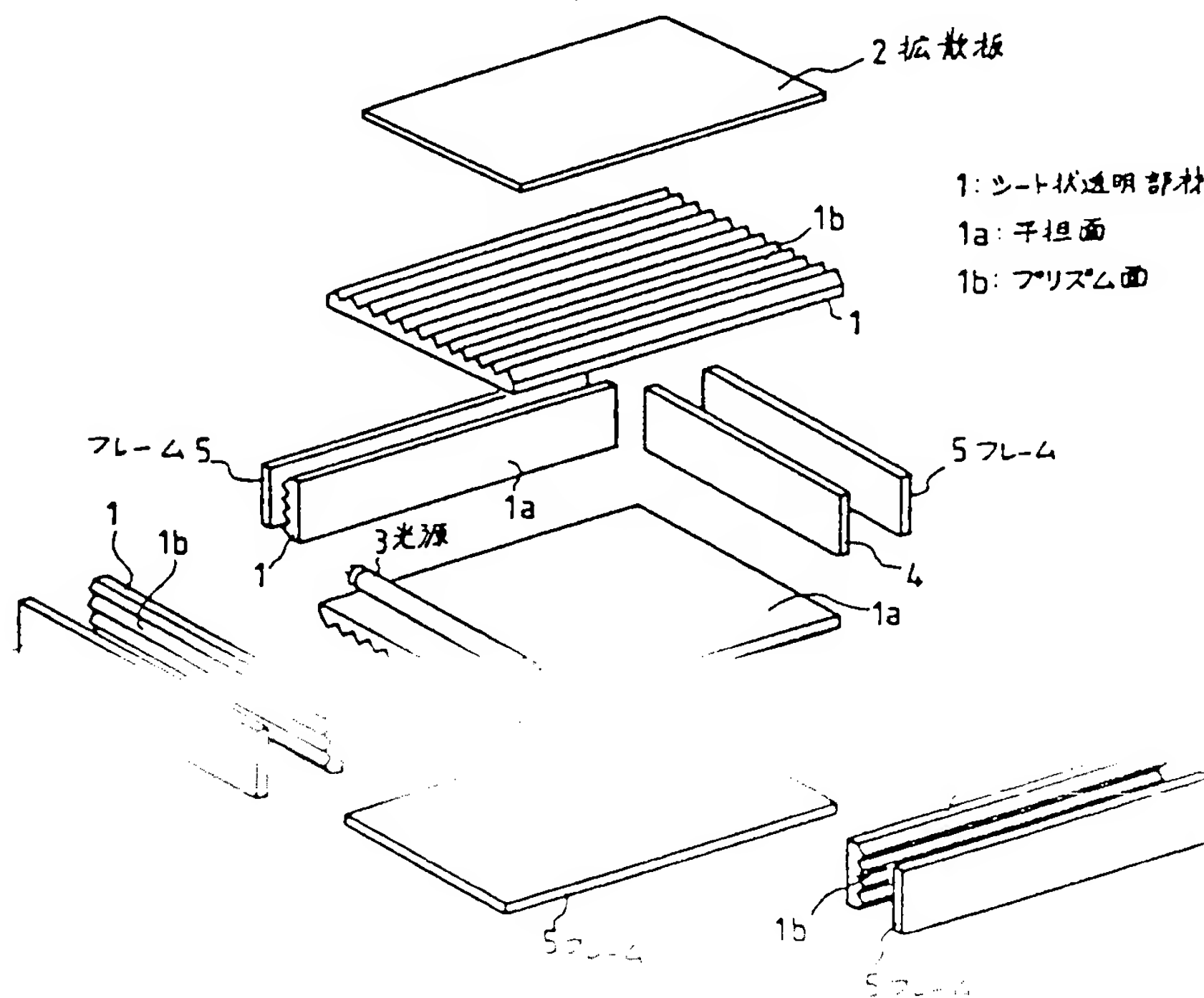
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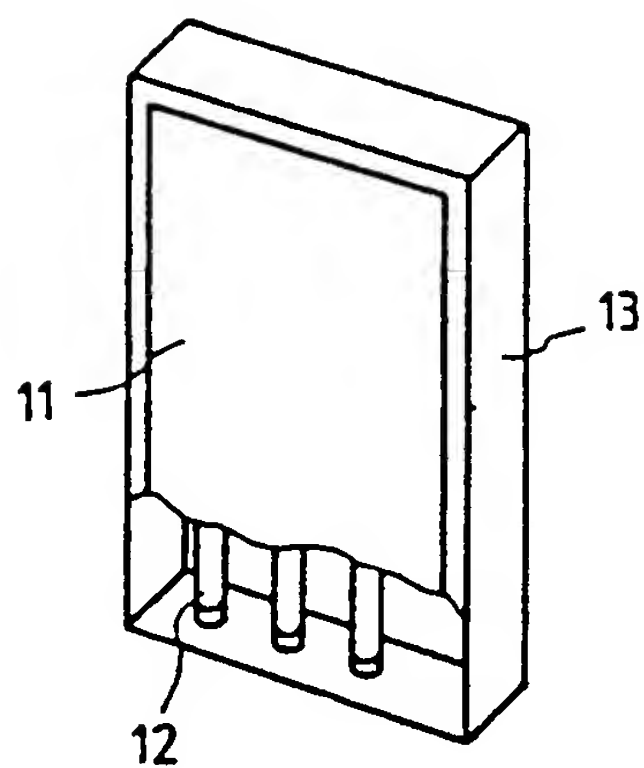
第 4 図



第 5 図



第 1 図



第 6 図

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⑮ 発明の名称 照明および表示用器具

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⑰ 出 願 昭62(1987)1月22日

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明 細 書

1. 発明の名称

照明および表示用器具

2. 特許請求の範囲

- (1) 發光灯等の線状の光源と該線状の光源を覆い、前記光源からの光を伝達するためのマイクロプリズムを連続して形成したシート状透明部材を少なくとも二面以上装着した箱体よりなることを特徴とするおよび表示用器具。
- (2) 該線状の光源の長手方向がシート状透明部材のマイクロプリズムの頂角の稜線の方角に対してほぼ直角となるように配置された特許請求の範囲第1項記載の照明および表示用器具。

- (4) シート状透明部材がそのマイクロプリズム頂角の稜線の發光体の長手方向との成す角がほぼ直角となる方向に配置され、頂角側の面を各々照明側に向けて装着した特許請求の範囲第1項記載の照明および表示用器具。

- (5) 均一な照度分布を得る目的で線状の光源をカバーで被覆した特許請求の範囲第1項記載の照明および表示用器具。

- (6) シート状透明部材の外面に表示を施した光拡散性材料を配した特許請求の範囲第1項記載の照明および表示器具。

3. 発明の詳細な説明

産業上の利用分野

本発明は、広告等に使用することも可能な発光

用器具に関するものである。

従来の技術

従来のある特定の面積を光らせる照明および表示用器具は、例えば第6図に示すように、光拡散性材料よりなる拡散板11と、

光源が望ましい面より入射するように頂角側の面が照明および表示用器具の外の方角に向けて設置される特許請求の範囲第1項記載の照明および表示用器具。

照らすための複数本の蛍光灯(12)と、該拡散板(11)と該蛍光灯(12)とをささえるフレーム(13)とから構成されるのが一般的である。しかしながら、このような器具の場合、発光面である拡散板(11)の明るさを均一に保つために拡散板(11)と蛍光灯(12)との距離を大きくとらねばならず、その結果、器具の厚みが増す欠点があった。また、拡散板(11)と蛍光灯(12)との距離が大きくなればなるほど拡散板(11)から発せられる光量は落ち、それを補うために蛍光灯(12)の本数を増さなければならず、器具の構造も複雑になり、重量も大きく、消費電力も高いものになっていた。

従来のこのような照明および表示用器具は屋外広告灯や写真フィルム用のシャーカステン等に用いられているが、屋外広告灯として用いた場合に取付時重量の大きいものは作業性が悪くなり、蛍光灯の本数が多いと価格が高くなり、蛍光灯の交換の回数も増え、消費電力も高くなるという大きな欠点があった。また、写真用シャーカステンと

して用いた場合、蛍光灯の有る部分と無い部分とで、発光面の拡散板に明るさのむらができ、写真フィルムを観察する場合の大きな弊害となっていた。また装置の厚みが厚いため、専用の観察台を必要とするなど運用の不便さがあった。

発明が解決すべき問題点

本発明の目的は、従来の照明および表示器具における欠点を解消すべく、明るさのむらのない発光面を有し、薄型で軽く、消費電力の少ない照明および表示用器具を提供することにある。

問題点を解決するための手段

本発明の照明および表示用器具は、蛍光灯等の線状の光源と該線状の光源を覆い、前記光源からの光を伝達するためのマイクロプリズムを連続して形成したシート状透明部材を少なくとも二面以上装着した箱体よりなることを特徴とする構成を有する。

実施例

以下、図をもって本発明の実施例を説明する。

第1図は本発明を適用した照明および表示用器

具の分解図を示す。

シート状透明部材(1)は透明な樹脂材料でできおり、一面は平坦面(1a)で、他面はプリズムが連続的に並設されたプリズム面(11)でできている。拡散板(2)は乳白色をした光拡散性材料でできおり、発光面となり、必要に応じて広告等の表示を施す。光源(3)は、蛍光灯などの線状のものを用いる。反射板(4)は光源(3)の光を充分反射しうる反射率をもった材料、例えばアルミ蒸着樹脂シートでできている。フレーム(5)は光を通さない材料、例えば鉄板でできおり、シート状透明部材(1)と接する面は白色になっている。

第2図は本発明を適用した照明装置の断面図を示す。シート状部材(1)は、プリズム面(1b)を

(4)を取付ける面以外の面に付けられる。光源(3)は幅広のシート状透明部材(1)のプリズムの頂角の稜線と光源(3)の長手方向がほぼ直角になるように取付けられている。光源(3)に対向した遠隔位置に反射板(4)が取付けられている。

次に、前記本発明の実施例の作用を示す。

光源(3)より発せられた光は、まず、シート状透明部材(1)の平坦面(1a)に当り、一部はそのまま漏洩し、また、その残りは反射していき、最後に反射板(4)で反射されて、また器具内で反射と漏洩をくり返していく。その結果、シート状透明部材(1)から漏洩する光はその位置に関係なくほとんど一様になり、さらにその光が拡散板(2)を通過することにより拡散され、均一に発光する

のようになる。

また、図3

図4により反射され再び器具内部に導かれる。この作用により、拡散板(2)以外の面から漏洩した光がそのまま外部に拡散されるものにくらべて、拡散板(2)から発生する光の量が倍以上になる。

取付方法としては両面粘着テープを用いる方法、熱融着する方法など、種々考えられるが、なるべくプリズム面(1b)をつぶさないで取付けることが重要である。シート状透明部材(1)は反射板

る。

以上の実施例では、拡散板(2)は一面のみであったが、2面以上の拡散板を設け、多数の発光面とすることもできる。また、フレーム(5)の内面は白色でなく、反射ミラーを用いてもよい。光源としては、蛍光灯のような線状光源を用いず、白熱灯のような点光源を複数設けると照明むらの原因になりやすく、点光源からの発熱により、シート状透明部材(1)の変形等の種々の弊害が生じるので線状光源を用いるのがよい。線状光源は、蛍光灯に限ったものではなく、ネオン管、線状に形成された白熱灯なども考えられる。

また、第3図に示すように、光源(3)の幅狭フレーム(5)に近い側に断面が放物線かそれに近い形をした反射板(6)を固定し、それと対向した位置に反射板(6)と同様な形状をした別の反射板(7)を固定することにより、光源(3)から発せられた光が効率よくシート状透明部材(1)に導かれ、その結果、拡散板(2)から発光される光量を増すことができる。なお、一層光量を増す必要がある

っている光の放出開口(8)を有した光を通さないカバー(9)を蛍光灯(10)の長手方向につける。こうすることにより、蛍光灯(10)の中央部と両端部との光量の差がなくなり、さらに360度の方向に放射状に広がっていた光を必要な方向に集中できるので光量が増加する利点がある。第5図も第4図と同様であるが、開口(8)を軸線に平行な二個にしてカバー(9)の形状を簡単にしたものである。

発明の効果

以上述べたように、本発明によれば、従来多数本有していた光源を一本ないしは二本ですますことができ、従って、消費電力も少なく軽量で薄型にすることができる。また、プリズムの作用によ

は減少する。点光源からの発熱の影響を回避できる。

本発明を屋外広告灯に適用すれば、軽量なため、設置作業が容易で、薄型なため、設置場所が

場合は別の反射板(7)の前にも線状光源を配置するとよい。

前記各実施例では、シート状透明部材(1)を反射板(4)を貼った面以外の面全てに貼ったが、光源(3)に充分細長いものを用い、照明および表示用器具の厚みが充分薄い場合には、シート状透明部材(1)を貼る面は拡散板(2)の面と、それと対向したフレーム(5)の面だけで実用上問題が無い。シート状透明部材(1)は樹脂に限らず、透明なガラス等でも作ることとは可能である。

次に、照明むらをより少なくし、発光面の光量を増加させた光源について、第4図及び第5図を用いて説明する。蛍光灯の光量の分布を調べると、中央が明るく、両端部は光量が落ちており、発光面の照度むらの原因となっている。また、蛍光灯の光は、360度の方向に放射状に出ているため、そのまま本発明の照明および表示用器具に適用した場合有効に利用されていない光が多量にある。以上2点の欠点を改良する手段として、第4図に示すごとく、中央部が狭く、両端に行くほど広が

らず、蛍光灯の本数が少ないため、消費電力が小さくてすむという利点がある。また、写真フィルム用シャカステンに適用した場合は、発光面の明るさのむらが小さいので、写真の観察作業が正確に行ないやすくなり、薄型、軽量のため持ち運びがしやすくなり、既存の机の上に置いても作業が行いづらくなることはない。そのほかにも、本発明を適用した照明および表示用器具は種々できることは言うまでもない。

4. 図面の簡単な説明

第1図は、本発明を適用した照明および表示用器具の実施例の分解斜視図、

第2図は、第1図の断面図、

第3図は本発明の別の実施例の断面図、

第4図は、第1図の変形例を示す上面図、

第5図は、第4図の変形例を示す上面図、

第6図は、従来の照明および表示用器具の一部

破断斜視図である。

1 シート状透明部材 2 拡散板 3 光源

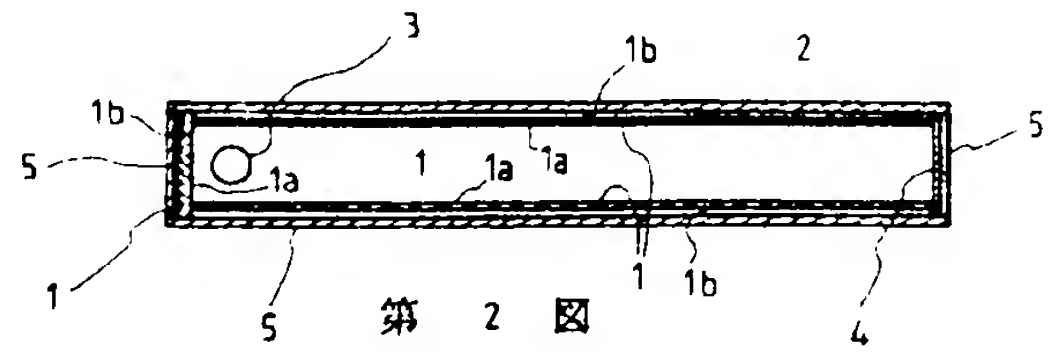
プリズム面、2…拡散板、3…光源、4…反射板、
5…フレーム、6、7…反射板、8…開口、9…
カバー。

特許出願人 伊 東 基 助

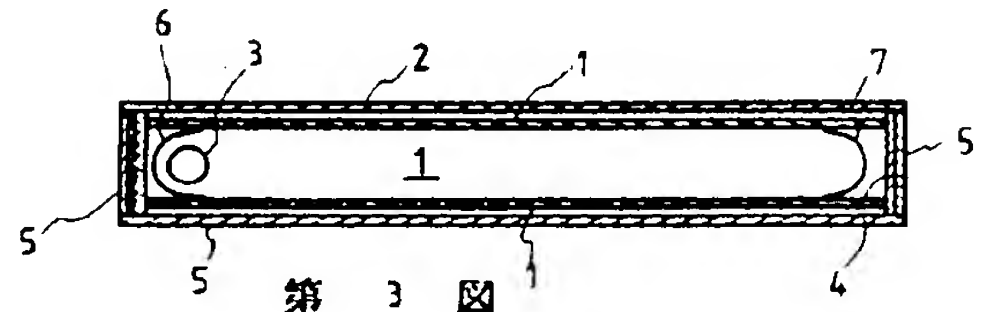
(ほか1名)

代理人 弁理士 竹 本 松 司

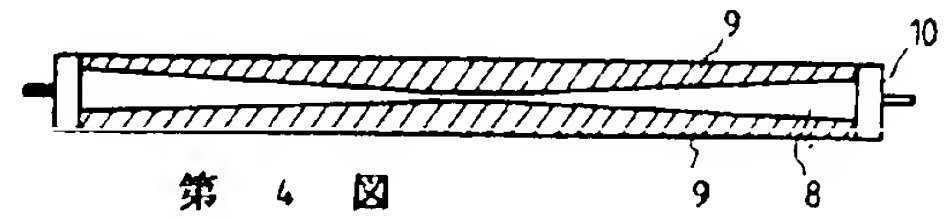
(ほか3名)



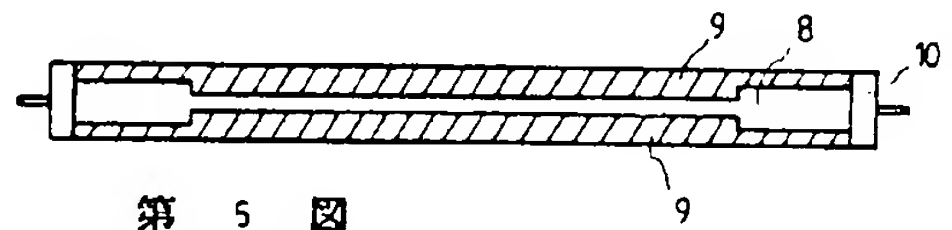
第 2 図



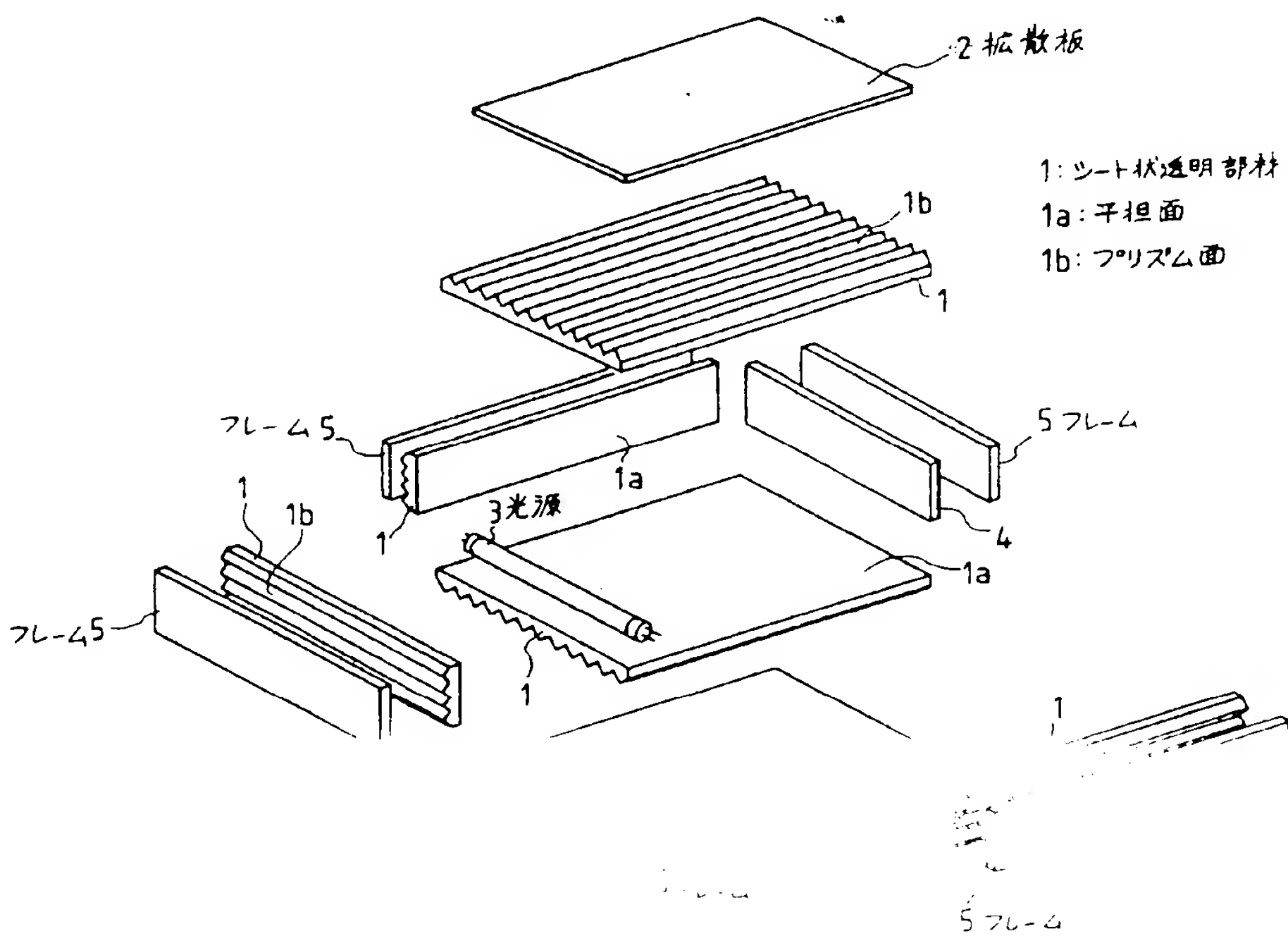
第 3 図



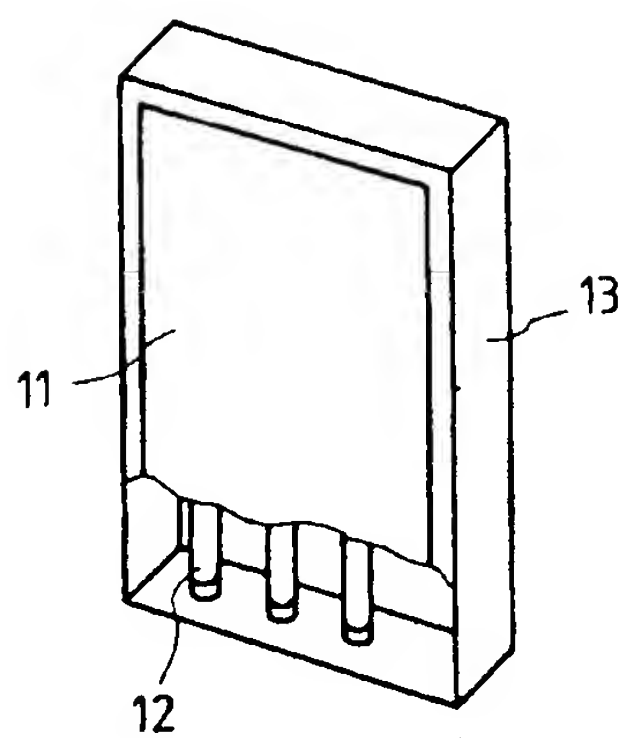
第 4 図



第 5 図



第 1 図



第 6 図